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GAS ABSTRACTS

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CONTENTS

1. Gas Industry 185
2. Appliances 186
3. Combustion and Industrial Furnaces 188
4. Carbonization and Gasification 189
5. Natural Gas and Natural Gas Condensates 193
6. Petroleum and Synthetic Liquid Fuels 196
8. General and Physical Chemistry 199
9. Organic Chemistry 201
10. Chemical Engineering 202
11. Process Equipment and Instrumentation 203
12. Materials of Construction 204

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I. GAS INDUSTRY

Contract Uniformity

Stirling, J. C. STANDARDIZED CONTRACT NEEDED. *World Oil*, 135, 253, 254 (1952) August.

Some items required in pipeline construction specifications issued to bidding construction companies are listed. Lack of uniformity in specifications is prevalent and troublesome. Lack of clarity is costly. The author belittles the effect of slack in laying a line and claims that temperature variation can never be great enough to be serious. J. D. Parent

End-Use Regulation

RE WISCONSIN NATURAL GAS COMPANY. *Public Utilities Fortn.*, 50, 59-62 (1952) August 14.

The Wisconsin PSC has decided that the Wisconsin Natural Gas Co. acted properly when it required two unauthorized space-heating customers to discontinue the use of gas for space heating. J. D. Parent

Gas Gathering Tax

COURT RULES AGAINST TEXAS GAS GATHERING TAX: APPEAL TO BE FILED. *Bull. Independent Natural Gas Assoc.* No. 319, 2 (1952) August 1.

A district court ruling has been made on the Texas gathering tax of 9/20¢ per Mcf. to the effect that it is a burden on interstate commerce and, therefore, unconstitutional. Appeal probably will be made. J. D. Parent

Industry Expansion

Duff, D. M. NATURAL-GAS INDUSTRY STILL EXPANDING. *Oil Gas J.*, 51, 228, 230 (1952) July 28.

The natural gas industry is still expanding, as shown by figures quoted in this article. Further, the demand for natural gas is far from satisfied. Many problems such as steel shortage, increased costs and unwillingness of oil companies to risk FPC regulation beset the industry.

J. D. Parent

GAS INDUSTRY WILL SPEND $5.6 BILLION IN EXPANSION NEXT FIVE YEARS. *Gas Age*, 110, 30, 64, 54 (1952) July 31.

The gas industry plans to spend 5.6 billion dollars for expansion within the next five years. This compares to 5.1 billion during the last five years. Almost 5.1 billion will be spent in the natural gas branch of the industry.

J. D. Parent

LARGE CALIFORNIA GAS LINE EXPANSION TOTAL COST WILL BE AROUND $127 MILLION. *Pipe Line News*, 24, 55, 56 (1952) August.

The FPC has approved expansion of natural gas transmission lines in California costing $126 million. An additional 300 MMCF per day total installation is planned. El Paso Natural Gas proposes to secure 100 MMCF/day from the San Juan Basin and 200 MMCF/day from the Permian Basin. J. D. Parent

Italian Natural Gas

Padovani, C. LE DÉVELOPPEMENT DE L'INDUSTRIE DU GAZ NATURAL EN ITALIE. (THE DEVELOPMENT OF THE NATURAL GAS INDUSTRY IN ITALY). *J. Usines a Gaz*, 76, 229-231 (1952) July.

The author cites Latin historians, Galvani, Volta, and others as ones who knew of gas occurrences in Italy. Actual work of development and chemical identification of methane was started in 1925 by the A.G.I.P. and a huge increase in the production of it was realized in 1935-1940, mostly in the Po Valley. At present the reserve of natural gas is estimated as 2,100 billion CF, which at 100 billion CF/yr would replace one half the quantity of coal Italy needs for twenty years. Nature has put this valuable resource right in the heart of the northern industrial region; this affords easy distribution and a product at a relatively low cost. So far chemical industries and power production plants have the most advantage. The 1,500 million CF/day for domestic use in 1951 is at present 3-4% of the total, but it will be possible to reach a 20-25% level. The 760-mile network of 6 to 18-inch pipelines of the A.G.I.P. will be tripled by 1953. American units for methane reforming for utility gas will be installed in three cities this year. S. Sensi

"Liberal" Regulation

Osborne, J. NATURAL GAS AND THE AUTHORITARIAN "LIBERALS". *Independent Petroleum Assoc. of Amer. Monthly*, 34, 19, 21, 48, 55 (1952) August.

In a study of the FPC and its regulation of the natural gas industry, the author throws a spotlight on a pernicious dogma, dangerous to business, dangerous to government, and dangerous to democracy, advanced by "liberals" who hold that "industry" and "the public" are natural foes, and that regulatory bodies must always decide "for" one and "against" the other. The article closes with thumbnail sketches of past and present FPC members. A. E. Neumann

Northwest Gas Project

FIRM TO SPEND $40,000,000 FOR SAN JUAN UINTA SUPPLY. *Oil Gas J.*, 51, 183 (1952) August 25.

Pacific Northwest Pipeline Co. is now seeking to build a 1,300 mi. line to serve the Pacific Northwest. Supply would be from the San Juan and Uinta basins. J. D. Parent

Rate Making

Randolph, J. P. RATE MAKING AND INFLATION. *Public Utilities Fortn.*, 50, 3-6 (1952) July 3.

Important judicial cases dealing with the theory of rate making are briefly reviewed. The courts have upheld the responsibility of the commissions to fix rates wisely and have not restricted them with rigid legal formulas. Among the most vexing of the current problems in rate making are the increased cost of doing business and the need for increased depreciation allowance, both the result of inflation. Some commissions are trying to counteract the effect of inflation by considering not merely present and past conditions but probable future conditions.

J. D. Parent

Regulated Conservation

Doerfer, J. C. GAS REGULATION FROM THE CONSUMER'S VIEWPOINT. *Public Utilities Fortn.*, 50, 84-87 (1952) July 17.

The author feels that there should be greatly improved conservation practices to reduce natural gas waste during production. Selective use policies and storage development are also strongly supported. J. D. Parent

Well-Head Price

9.8262¢ MINIMUM PRICE SET FOR GAS FROM GUYMON SECTION OF HUGOTON. Bull. *Independent Natural Gas Assoc. of America*, No. 319, 3 (1952) August 1.

The well-head minimum price in the Guyman section of the Hugoton field has been raised by State Corporation Commission to 9.8262¢ from 7¢ per Mcf. J. D. Parent

2. APPLIANCES

Appliance Testing

Bennett, C. E. and Hall, E. L. APPLIANCE APPROVAL IN THE STATES. *Gas J.* (British), 271, 308-11, 315 (1952) August 6: *Rev. Generale du Gaz* (Belgian), 74, 145-146 (1952) May/June.

A brief history is given of the growth of appliance approval methods. The place of the American Gas Association Testing Laboratory in the improvement of gas appliances is shown.

D. L. Nicol

Deep-Fat Fryers

Amer. Gas Assoc. Project IA-1. DESIGN STUDIES OF GAS DEEP-FAT FRYERS. Amer. Gas Assoc. Labs. Research Bulletin No. 66 (1952) May.

A practical and theoretical analysis of all factors affecting gas deep-fat fryer performance was made, to permit development of a prototype model having greater frying capacity and improved heat utilization. Fat deterioration in fryers used steadily for heavy-duty cooking was found to be mainly caused by the hydrolysis reaction with water evolved from foods during frying. Extended surfaces or fins on the gas side of fry kettle walls were found to provide a satisfactory method of obtaining augmented area. The fat-side resistance to heat flow was found to be relatively unimportant. Heat absorption studies of french-fried potatoes yielded a method of calculating their heat requirement as roughly 600 Btu per raw pound. Cyclic analysis of repeated batch frying provided a technique for evaluating fryers from both food heat and

burner heat utilization measurements.* Alignment charts were developed to simplify analysis of fryer cyclic performance, efficiency vs. surface area, and heating speed. A chart is given for flue losses with natural, manufactured, propane and butane gases. Authors' Abstract

AN IMPROVED DEEP FAT FRYER. *Ind. Gas* (British), **15**, 308-310 (1952) July.

Operation of a modern deep fat fryer is discussed. A graph is given to illustrate the rapid temperature recovery of the fryer under bad conditions. E. F. Searight

Heat Pump

Callahan, J. P. THE HEAT PUMP UP TO DATE. *Public Utilities Fortn.*, **50**, 161-164 (1952) July 31.

A general discussion of heat pumps, their use today and costs involved in installing and operation is presented. The general opinion expressed is that the heat pump would be economic if power is available for 1¢/kwh. Present widespread use is therefore not feasible. W. G. Bair

Hooper, F. C. AN EXPERIMENTAL RESIDENTIAL HEAT PUMP. *Can. J. Technology*, **30**, 180-197 (1952) July-August.

An investigation of the applicability of the heat pump system to residential heating in Ontario is described. An experimental installation consisting of a ground-source heat pump supplemented by resistance heaters, was made in an occupied residence. The ground coil used a secondary refrigerant of ethyl alcohol and water in ¾-inch copper tubing laid at a depth of 5 ft. and at a horizontal spacing of 6 ft. It will be noted that although the resistance heaters imposed 66% of the maximum demand and consumed 29.5% of the electric power, they supplied only 16% of the seasonal heat requirements. D. L. Nicol

Penrod, E. B. OPERATING PERFORMANCE OF A HEAT PUMP WATER HEATER. *Heating and Ventilating*, **49**, 63-68 (1952) July.

A Master Kraft heat pump water heater was studied. Test equipment used and results obtained are given. A package heat pump for heating and cooling a house varies at present prices from $2700 to $6000, depending upon capacity. B. G. Lang

House Heating

Gilliss, W. W., Jr. HOUSE HEATING SERVICE BY UTILITY ASSURES CUSTOMER SATISFACTION AND FUEL POSITION. *Am. Gas J.* **177**, 15, 20 (1952) July.

This article emphasizes the importance of good house heating service to guarantee customer satisfaction. The article also discusses the procedure followed by the company in educating the customers in the use of gas heating equipment. E. F. Searight

Interchangeability

Padovani, C. and Raimondo, E. CONSIDERAZIONI SULLE CARATTERISTICHE DI COMBUSTIONE DEL METANO IN RAPPORTO AL SUO IMPIEGO NEGLI APPARECCHI PER UTILIZZAZIONE DOMESTICA (CONSIDERATIONS UPON THE USE OF METHANE IN DOMESTIC APPLIANCES). *Rivista dei Combustibili*, **6**, 363-376 (1952) June.

The authors discuss the problem of methane utilization for domestic appliances in substitution for manufactured gas. The following physical and combustion properties of methane are examined in comparison with those of manufactured gas: heat value, specific gravity, Wobbe index, air requirement, thermal imput, flame-speed, limits of inflammability, combustion density. Particular attention is given to the differences existing between the two types of gases, specially those regarding the heat value and the flame-speed. When designing burners for natural gas, or using for this purpose the ones built for coal gas, the most important problems to be faced will be: very high air requirement, reduction in the limits of inflammability and, above all, low flame-speed of the methane. When natural gas is substituted for manufactured gas, an incomplete combustion, interruption of flame, or a remarkable reduction of thermal output might occur without the necessary modifications to the appliances, which are briefly outlined for the case. S. Sensi

3. COMBUSTION AND INDUSTRIAL FURNACES

Annealing Furnace

MODERN METHOD OF ANNEALING STEEL SHEETS. *Ind. Gas* (British), 15, 312-315 (1952) July.

An installation using four lift-off type radiant gas furnaces for annealing sheet steel is discussed. E. F. Searight

Boiler Conversion

Reagan, L. S. CONVERTING BOILERS TO GAS FUEL. *Southern Power Industry*, 70, 72-73 (1952) August.

The factors of converting oil or coal fueled boilers to a gas fuel are discussed. These are draft, combustion space, exposed heat transfer area, burner type and air-gas mixing systems. Comparative efficiency data on average operation for boilers of 500 H.P. and under are given. D. L. Nicol

Gas Turbines

Bowen, I. G. GAS TURBINES. PART III. *Coke and Gas* (British), 14, 201-207 (1952) June.

This third and concluding article on gas turbines covers some of the existing and projected designs, along with their mechanical and economic features. The application of gas turbines for oxygen and nitric acid production is discussed. Flow diagrams are included for a number of the designs. E. J. Pyrcioch

Glass Finishing

LeMay, R. C. NEW APPROACH TO FIRE POLISHING OF GLASSWARE EMBODIES FOUR SIGNIFICANT FEATURES. (Inf. letter No. 47 of AGA Ind. & Com. Gas Sect., May, 1952). *Ind. Gas* 31, 5-7 (1952) July.

Burner equipment has been developed for fire polishing that distinguishes between the heating of bodies and fusion of edges or surfaces. Other features include separate and independent control over flame retention and flame quality, conclose control of flame temperature and speed. Of particular note is the addition of hydrogen to natural gas up to 20 and 30% to maintain flame speeds and slopes for manufactured-gas designs of equipment. D. L. Nicol

Ore Reduction

Elliott, J. F., Buchanan, R. A., and Wagstaff, J. B. PHYSICAL CONDITIONS IN THE COMBUSTION AND SMELTING ZONES OF A BLAST FURNACE. *J. Metals*, 4, 709-717 (1952) July.

High speed photography through blast-furnace tuyeres indicates that the coke particles and gas travel at high speed in a narrow circular path of 2 to 5 ft. diam. in front of each tuyere. Model studies with air and wood blocks have helped define the size of this zone; and also of the melting zone above. O P. Brysch

Radiant Tubes

Corns, E. A. (assigned to L. Wilson) COMBUSTION TUBE HEATING APPARATUS. U.S. 2,602,440 (1952) July 8.

A new method of design of radiant tube burners is described. This burner makes use of heat exchange to heat the unburnt gas at the burner by counter-flow of flue gases. This burner further permits the hanging of the radiant tube in a loop; the tubing and exit ends being placed through a single furnace opening and providing for complete expansion without stress on holder brackets. D. L. Nicol

Test Burner

Cannon, M. M., Jr. (assigned to Emhart Manufacturing Co.) MEANS FOR AND METHOD OF ASCERTAINING COMBUSTION CHARACTERISTICS OF PREMIXTURES. U.S. 2,603,085 (1952) July 15.

A test burner is described for the determination of the flame temperature and degree of complete combustion attained by a gas-air mixture being used in industrial burners. This burner gives a quantitative measure of the relative proportions of air and gas in the stream and affords a method to indicate control on the air-mixing valve. D. L. Nicol

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Grumer, J. FLAME STABILITY LIMITS OF METHANE, HYDROGEN AND CARBON MONOXIDE MIXTURES. p. 199

Lichty, L. C. EVALUATION OF FLAME SPEEDS. p. 199

4. CARBONIZATION AND GASIFICATION

Coal Ash

Townsend, L. G. A SPECIAL STUDY OF ASH AND CLINKER IN INDUSTRY. PAPER X. THE INFLUENCE OF ASH ON THE OPERATION OF GAS PRODUCERS IN THE GAS INDUSTRY. *J. Inst. Fuel* (British), **25**, 182-184 (1952) July.

Consideration is given to the effects of ash and clinker on the operational and constructional details of the three main types of gas producer employed in the manufacture of town gas. The effect of deterioration in coal quality on the coke produced from carbonization is passed on to the coke gasification plant, and this aspect is briefly considered. The influence of ash on the three main types of gas producer — i.e. step grates, mechanical producers and water-gas plants — is discussed. The variation in the ash content of refuse from these different types is considerable, and may be a factor in favor of installing plant with mechanical ash extraction. Operating details for such plants are dependent to a great extent on the nature and quantity of the ash and clinker, and this has a corresponding effect on thermal efficiency. The use of annular jackets on mechanical plants is considered from the point of view of wear and tear due to clinker adhesion, and the most satisfactory arrangements are described in respect of the particular type of gas producer employed by the Liverpool gas undertaking. It is suggested that development of new types of plant with increased output is hindered by difficulties associated with clinker formation. The reliability of water-gas plants in this direction is due to the wide variation possible in operating conditions. Author's Abstract

Coal Expansion Pressure

Pontypridd Test Plant Committee, BCRA. FURTHER STUDIES OF COKING PRESSURE: Brit. Coke Research Assoc. Tech. Paper No. 5 (1952) June; *Gas World* (British) 136 *(Coking Section)* 5-7 (1952) July 5.

This report gives the results obtained in the experimental-oven test program continued since Tech. Paper No. 2, December 1948. In a modified Russell moveable-wall oven, 150 charges were carbonized, and the wall pressures and internal pressures were measured under varying conditions. Influence of bulk density, rate of heating and blending were studied. Results of earlier studies were confirmed. A method of measuring internal pressures was developed, based upon the back pressure of a stream of nitrogen through a 1/8-inch nickel-chrome probe in the oven charge. This method indicated similar pressures within charges in the test oven and in commercial ovens at six plants but peaks with the latter of an order of twice the moveable-wall peak-pressure. High wall pressures occurred with certain Welsh coals and blends below 24% volatile matter at 52 pcf bulk density (dry). Reduction of bulk density, rather than reduced heating rates or breeze additions appeared to be the best means of limiting high coking pressures.

Coke and Gas (British),**14**, 280-284, 288 (1952) August. This critical review points out that the Pontypridd internal pressure method does not measure a true gas pressure, but is a modified Foxwell test of resistance of gas flow through plastic coal. O. P. Brysch

Coal Hydrogenation

Storch, H. H., and Pelipetz, M. G. (assigned to the United States of America.) HYDROGENATION LIQUEFACTION OF COAL EMPLOYING ZINC CATALYSTS. U.S. 2,606,142 (1952) August 5.

The patent relates to the method of pressure coal hydrogenation in the 275° to 700° C. temperature-range, using zinc and antimony catalyst mixtures in concentrations of 0.5 to 1 per cent by weight added to pulverized coal with or without oil addition. C. von Fredersdorff

Coal Reserves

Toenges, A. L., Turnbull, L. A., Davis, J. D., Reynolds, D. A., Parks, B. C., Cooper, H. M. and Abernethy, R. F. COAL DEPOSIT, COAL CREEK DISTRICT, GUNNISON COUNTY, COLO.: RESERVES, COKING PROPERTIES, AND PETROGRAPHIC AND CHEMICAL CHARACTERISTICS. U.S. Bureau of Mines Bull. 501 (1952).

Diamond drilling investigations in the Coal Creek district, Gunnison County, Colo. showed

that a total of 120,985,000 tons proved reserves of high-volatile B coals occurs in 3 minable beds. Of this, 108,511,000 tons are of metallurgical quality. Carbonization tests on large-diameter drill-core coal samples were made in the 13-inch BM-AGA-retort. The lowest bed yielded the strongest coke (higher than Sunnyside) which would be suitable for Western blast-furnace practice, without washing. Development of a 1200-ft. deep shaft mine, producing 4000 tons/day is outlined. Tabulated data for carbonizing assays, drill core analyses and drill-hole logs are given. O. P. Brysch

Coke-Steam Reaction

Brender, I. G., Brandis and Felsbourg, J. THE REACTIVITY OF COKE ESPECIALLY TO STEAM. *Gas World* (British) **28**, 689-690 (1952) June 28.

A detailed description of the apparatus is presented in determining the reactivity of various cokes to steam. The results indicate three criteria which may be used to determine the coke reactivity. They are: (1) the rate of gas make, (2) the percent of steam decomposed, and (3) the percent of carbon dioxide in the make-gas. S. Mori

Coking Properties

Oele, A. P. UNTERSUCHUNGEN UEBER DIE ERWEICHUNG, DAS BLAEHVERMOEGEN UND DAS TREIBEN IM BEREICH DER FETTKOHLE. (RESEARCH ON THE SOFTENING, SWELLING POWER AND EXPANSION PRESSURE IN THE RANGE OF BITUMINOUS COALS.) *Brennstoff-Chemie,* (German) **33**, 231-238 (1952) July.

After a review of past European researches on the fundamental processes occurring during coking, the author discusses some results obtained in the laboratory on Limburg (Netherlands) bituminous coals. Selected vitrit and clarit fractions preheated to 380° C. (softening temp.) developed a "thermobitumen" which could be extracted (etched) from the grain surfaces to show a haircracked bubble-structure under the microscope. This thermobitumen is believed to wet and to further soften the remaining coal substance which then may swell readily. Fusite (or added "leaning" agents) produce great reduction of swelling. The time (or temperature) interval from the point of greatest swelling up to the point of complete solidification is called the "phase difference" in the decomposing, hardening thermobitumen which has saturated the coal mass and rendered it plastic. In older (low volatile) bituminous coals, this "phase difference" is absent, and rapid hardening prevents further deformation and shrinkage, and thereby could cause high gas pressures in the plastic seam which are transmitted to the oven walls. O. P. Brysch

Cracker-Gasifier

Coghlan, C. A. (assigned to The Texas Company) CONVERSION OF HEAVY CARBONACEOUS OILS TO MOTOR FUELS, FUEL GAS, AND SYNTHESIS GAS. U.S. 2,605,215 (1952) July 29.

A process for converting heavy residual oils to motor fuel and synthesis gas is described. The reaction consists of two separate vessels mounted one above the other. The oil charge is sprayed in the top of the upper vessel and is gasified by hot gases rising from the bottom of the vessel. The residual oil is stripped of all volatile matter and the remaining small coke particles are withdrawn from the bottom of the vessel and passed into the lower vessel where they are reacted with steam and O_2 in a fluid bed to produce synthesis gas. A portion of this synthesis gas and steam is used to effect the cracking in the upper reactor. W. G. Bair

Fluidized Carbonization

Creelman, G. D. (assigned to Pittsburgh Consolidation Coal Co.) TREATMENT OF CARBONACEOUS SOLIDS. U.S. 2,606,145 (1952) August 5.

The invention relates to a method of distilling carbonaceous solids in a fluidized bed utilizing hot combustion gases obtained from separately burning the fines carry-over from the fluid reactor. C. von Fredersdorff

Rex, W. A. (assigned to Standard Oil Development Co.) COKING OF CARBONACEOUS FUELS. U.S. 2,608,526 (1952) August 26.

More complete coking of oils, asphalts, coals, shales in a fluidized carbonization system is claimed by maintaining the feed in contact with a fluidized preheated bed in a narrow elongated

transfer line. Velocity and temperature are controlled to avoid over-cracking of volatile products, and back-mixing of solids.

O. P. Brysch

High Btu Gas

Morgan, J. J. GASIFICATION OF HYDROCARBONS FOR PRODUCTION OF GASES. CHAPTER V. HIGH B.T.U. WATER GAS. (Part I) *Gas Age*, **110**, 31-35 (1952) July 31.

This section deals with operating details and results of the methods of manufacture of 800 to 1000 Btu water gas, as reported from 1928 to 1936.

CHAPTER V. HIGH B.T.U. WATER GAS. (Part II) *Gas Age*, **110**, 44-49 (1952) August 14.

Experimental and regular operating results for high Btu water gas as reported from 1931 to 1947 are given. Reverse flow machines, low specific gravity, tar and lampblack problems, standby services, solid fuel troubles and use of butane are discussed.

CHAPTER VI. HIGH B.T.U. OIL GAS FROM LOW CARBON OILS. (Part I) *Gas Age*, **110**, 39-44 (1952) August 28.

The various plant developments of the refractory-screen process, as well as the recirculated oil gas and modified water gas processes, are given in some detail. O. P. Brysch

Hydrogen Production

Christian, D. C. and Reed, R. M. (assigned to The Girdler Corporation) PROCESS FOR PRODUCTION OF HYDROGEN AND CARBON DIOXIDE. U.S. 2,602,020 (1952) July 1.

The patent claims that a catalyst composed essentially of iron oxide with 1-15% chromium oxide and 8-15% free water when pelleted at 35,000 psi may be used in a process for producing hydrogen and carbon dioxide from carbon monoxide and water. The catalyst is heated to operating temperature by passing a gaseous heating medium comprising steam in contact with the catalyst. H. A. Dirksen

Methane from Coal

Egerton, A. METHANE AND COAL. *Nature* (British), **170**, 93-97 (1952) July 19.

This article discusses possible methods for recovering and utilizing the methane present in the pores of coal, and in the ventilating air from coal mines. E. F. Searight

Methane Reforming

Padovani, C., Salvi, G. and Distante, G. CONSIDERAZIONI TERMODINAMICHE SULLA CONVERSIONE DEL METANO CON VAPOR D' ACQUA. (THERMODYNAMIC CONSIDERATIONS UPON THE CONVERSION OF METHANE WITH STEAM.) *Rivista dei Combustibili*, **6**, 377-391 (1952) June.

The aim of this study is to calculate the equilibrium composition of gases given by reforming reactions with the variations of temperatures and quantity of steam, and establish the minimum quantity of H_2O needed at a given temperature, so that the formation of carbon black be avoided. From the general equation $CH_4+H_2O = CO+3H_2$ the authors discuss the various reactions occurring at different temperatures. They show from a graph that the constants of the reaction $C+H_2$; $C+CO = 2\,CO$ increase together with the temperature and their values tend to become uniform around 600° C., i.e. at low or high temperatures these reactions intervene to eliminate the deposited carbon either through a methane synthesis (with H) or with a CO gasification.

S. Sensi

Modern Mining

Newell, J. P. and Storey, R. W. EXPERIMENTS WITH AN UNDERGROUND AUGER. *Trans. A.I.M.E., Mining Eng.*, **4**, 677-681 (1952) July.

Results of 10 months operation of a coal-cutting auger of 25 in. diam. are given. No. 3 Elkhorn Seam, Pike County, Ky., of 32 in. coal thickness and very bad slate roof conditions was mined. Machine modifications, economics and projected production schemes are presented.

O. P. Brysch

STREAMLINED COAL-HANDLING GUIDE. *Coal Age*, **57**, 91-93, (1952) July.

Application of the principle of continuous flow to the materials handling jobs of coal mining and preparation will effect economies which will offset the great rise in production costs. These principles are applied in (1) design of mine,

where the tendency toward strip mining, and the use of big augers and longhole pillar drilling for remote mining, and of slope conveyors will concentrate the operations and services; (2) type of mining, where the flexible room-and-pillar-system is now being compared with the cutter-loaders and planers used in long-wall systems; and (3) type of equipment, where the present loading machines will be supplemented by the continuous mining devices now under development. In 1951, some 5.5 million tons were produced by 105 continuous miners (average 180 T/shift). O. P. Brysch

Oil Gas

Pearson, H. B. (assigned to Allied Chemical & Dye Corp.) MANUFACTURE OF COMBUSTIBLE GAS. U.S. 2,605,176, 2,605,177 (1952) July 29.

A gas-producing process utilizing low-grade petroleum oils as raw changing stock is claimed to produce a low gravity high Btu gas with the elimination of by-product carbon.

H. A. Dirksen

Oxide Purification

Bennett, B. B. POSSIBLE IMPROVEMENTS IN OXIDE PURIFICATION PRACTICE. *Natl. Gas Bull.* (Australia), 16, 8-13 (1952) May-June; *Gas Times* (British) 72, 285-293 (1952) Sept. 5.

Developments in oxide purification, including work on oxide materials, purification practices, tower purifiers, fluid bed, and combined liquid and oxide purification, are discussed with reference to improvement of Australian practice.

D. M. Mason

Synthesis Gas

Barber, E. M. (assigned to The Texas Company) INTERNAL-COMBUSTION ENGINE PRODUCTION OF SYNTHESIS GAS. U.S. 2,605,175 (1952) July 29.

The process described produces a synthesis gas containing H_2 and CO in approximately 2:1 ratio by reacting natural gas and high purity (90-99%) O_2 in an internal combustion engine. The O/C atomic ratio in the feed is held as near 1 as possible. In operation ratios of 0.96 are used and local O_2 is injected around the point of ignition just prior to firing. This injection prevents plug fouling, gives a faster combustion of the entire mixture and increases the usable power developed by the process.

W. G. Bair

Dickinson, N. L. (assigned to The M. W. Kellogg Co.) TREATMENT OF SOLID CARBON CONTAINING MATERIALS TO PRODUCE CARBON MONOXIDE FOR THE SYNTHESIS OF ORGANIC MATERIALS. U.S. 2,602,809 (1952) July 8.

A method for the formation of synthesis gas from carbonaceous materials using a metallic oxide catalyst in a fluidized bed is described. The exothermic heat of reaction may be provided by the regeneration of the metallic catalyst by oxidation with air in a separate chamber. This enables the use of air instead of oxygen without contaminating the product gas with nitrogen, for the use of pure oxygen here is uneconomical.

S. Mori

Volatile Matter

Given, P. H. EVOLUTION AND COMBUSTION OF VOLATILE MATTER FROM COALS. PART I. THERMAL DECOMPOSITION OF ORGANIC SUBSTANCES. *Brit. Coal Utilization Research Assoc. Monthly Bull.*, 16, 245-257 (1952) June.

A survey is given of the factors governing the pyrolysis of organic compounds of known structure, and the application of this chemical information to the pyrolysis of coal. Modes of molecular breakdown are discussed in some detail, with special reference to the work of Rossini, Sachanen, Hurd and Rice. Secondary reactions, polynuclear synthesis, catalysis, and primary decomposition of a solid are then treated with regard to their effects in coal pyrolysis. The complexity of the chain reactions is emphasized.

O. P. Brysch

Billington, A. H., Dryden, J. G. and Napier, D. H. PART II. THERMAL DECOMPOSITION OF COALS. *Brit. Coal Utilization Research Assoc. Monthly Bull.*, 16, 258-270 (1952) June.

Experimental work on coal and the various theories of volatile formation are reviewed extensively. Order of appearance of carbonization products, primary stages of pyrolysis, physical structure and effects of ambient fluid, rate of heating, "soaking" time and inorganic matter are summarized successfully. Chain reactions which simultaneously produce simple light compounds and complex condensation products provide the best overall explanation of the pyrolysis.

O. P. Brysch

Arthur, J. R. and Napier, D. H. PART III. COMBUSTION AND RELATED FACTORS. *Brit. Coal Utilization Research Assoc. Monthly Bull.*, 16, 309-319 (1952) July.

Extremely little has been reported about the combustibility of volatile matter, due to its inadequate description and to the practical difficulties of studying it. Effect of fuel bed conditions on rate of release of volatiles, and combustion of the simpler constituents are reviewed. For pure fuels the inflammability limits, burning velocities of hydrocarbons and carbon formation during combustion afford some significant information, but much study is needed to answer many basic questions on the combustion of the volatile matter of coals.

O. P. Brysch

Water Gas

Eaton, G. L. (assigned to United Engineers and Constructors Inc.) METHOD AND APPARATUS FOR THE MANUFACTURE OF CARBURETED WATER GAS. U.S. 2,606,828 (1952) August 12.

This patent covers improvements in process and apparatus for stagewise preheating of heavy carbureting oils using the waste-heat in the blow or blast gases, to increase the capacity of the set.

H. R. Linden

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Chicago Gas Grid

CHICAGO DISTRICT PIPELINE. *Gas News*, 15, 4-6 (1952) August.

Chicago District Pipeline Co. has about 90 miles of dual pipelines, having the receiving end of the company's operations located just outside of Joliet, Illinois. It acts as the final transportation stage of natural gas from the Texas fields to gas utilities in the Chicago district. The system includes two double 24-inch pipelines between Joliet and Chicago, but to deliver the increased amount of natural gas made available by the new Texas Illinois pipeline, Chicago District is now constructing several short take-off lines. Plans are being made for the laying of more mains.

G. S. Bieza

Compressibility Factors

Zimmerman, R. H. and Beitler, S. R. PROGRESS REPORT ON THE STUDY OF SUPER-COMPRESSIBILITY FACTORS FOR NATURAL GASES. *Trans. Am. Soc. Mech. Engrs.*, 74, 945-951 (1952) August.

A preprint of this article was abstracted in *Gas Abstracts*, 8, 119 (1952) June.

O. T. Bloomer

Condensate Production

Laurence, L. L. and Hayes, C. W. STABILIZATION OF HIGH GRAVITY CONDENSATE AND PRODUCTION OF NATURAL GASOLINE. *Petroleum Eng. (Reference Annual)*, 24, C18-C26 (1952) July 15.

The search for better production methods to increase revenue from gas condensate wells has led to employment of low temperature separation and a process for stabilizing the liquid recovery from that process. In the past, wherever possible natural gasoline plants have been employed to extract greater yields from gas-condensate production. Low temperature separation will yield separator liquid recovery comparable to gasoline plant extraction. This liquid is rich in both the lighter and the normally liquid hydrocarbons. By fractionating the separator liquid under controlled pressure and temperature, practically all of the stable components are produced to and remain in storage. In many cases further refinements to produce gasoline and liquefied petroleum gases can be added economically. Data presented here show the advantage of producing stabilized condensate.

Authors' Abstract

Gas Conditioning

Glasgow, C. O. LOW-TEMPERATURE SEPARATION FOR HIGH-PRESSURE GAS-DISTILLATE WELLS. *Trans. Am. Soc. Mech. Engrs.*, 74, 1093-1098 (1952) August.

A low-temperature separator for individual gas-distillate wells is described. This unit expands the high-pressure gas to a lower pressure and utilizes the cooling thus produced to lower the water and hydrocarbon content of the gas. Performance tests, and some calculated studies on performance under various temperature and pressure conditions are presented. References to the origin of this type of unit are given.

O. T. Bloomer

Gas Dehydration

Frazier, H. D. and Riesenfeld, F. C. (assigned to The Fluor Corp., Ltd.) DEHYDRATION OF GASES. U.S. 2,603,311 (1952) July 15.

It is claimed that the efficiency of gas dehydration could be improved by the use of glycol diluted by organic diluents. The effect of dilution is to reduce the viscosity of the glycol which would increase heat transfer and reduce regeneration temperature. D. C. Gami

Gas Separation

Berg, C. H. (assigned to Union Oil Co.) ADSORPTION PROCESS AND APPARATUS. U.S. 2,603,306 (1952) July 15.

A process for the continuous separation of the gaseous mixture by selective adsorption on solid granular adsorbents is described. It is found that separation of C_1 hydrocarbon from C_2 hydrocarbon is facilitated by the absence of C_3 hydrocarbons, and separation of C_2 hydrocarbon from C_3 hydrocarbon is improved by the presence of C_1 hydrocarbon. This knowledge is utilized in designing an adsorption tower so that C_1, C_2 and C_3 could be separated in pure form. D. C. Gami

H_2S Removal

Culbertson, L. and Connors, J. S. HOW TO RID NATURAL GAS OF UNDESIRABLE SULFUR COMPOUNDS. *Oil Gas J.*, **51**, 114-117 (1952) August 11.

Processes for desulfurization of gas are reviewed briefly. Cost estimates on the amine process are included. D. M. Mason

SULPHUR FROM HYDROGEN SULPHIDE. *Can. Chem. Processing*, **36**, 30-32 (1952) July.

This article describes the operation of Canada's first sulphur recovery plant, located at Jumping Pound Field, Alberta. It is owned by Shell Oil which supplies the feed stock from its gasoline plant operations. The feed stock, composed of approximately 35% hydrogen sulfide and 55% carbon dioxide, is split into two streams. One-third of the hydrogen sulfide is converted to sulphur dioxide, passed to a second catalytic furnace, and reacted with the remainder of the feed stock in a redox reaction which produces elemental sulphur. The gaseous products are cooled to about 500° F., the optimum temperature for conversion, and passed into a second catalytic converter. The waste gases are vented and the sulphur vapor is cooled and solidified in outdoor bins; subsequently, the solid sulphur is broken up for shipment. Both the conversion of hydrogen sulfide to sulphur dioxide and the redox reaction between these two compounds are exothermic reactions. The heat produced by these reactions is used for driving the sulphur circulating pump and heating the sulphur pit. Modified Tutwiler tests are run on the waste gases to ensure that the proper stoichiometric amounts of air and feed stock are being used. J. Wrozina

Hydrate Properties

Reamer, H. H., Selleck, F. T. and Sage, B. H. SOME PROPERTIES OF MIXED PARAFFINIC AND OLEFINIC HYDRATES. *J. Petroleum Technology*, **4**, 197-202 (1952) August.

Some hydrate-forming conditions for ethane, ethene, propane, propene and propane-propene mixtures are presented. A fairly complete hydrate bibliography is given. J. D. Parent

LP-Gas Sales

Coumbe, A. T. and Avery, I. F. LP-GAS SALES CONTINUE UPWARD TREND WITH 21 PER CENT GAIN IN 1951. *Gas Age* **110**, 26-29 (1952) August 28.

The upward trend in LP-gas sales continued through 1951, the climb being 21.4%. Gains were made in all types of uses, but use in internal combustion engines doubled and now represents 6.8% of all sales. Average prices rose slightly from 6.3¢/gal. in 1950 to 7.1¢ in 1951. J. D. Parent

LP-Gas Underground Storage

Reidel, J. C. L.P.G. GOES UNDERGROUND. *Oil Gas J.*, **51**, 70-71 (1952) July 14: 260, 300-302, July 28.

In less than two years underground storage of LP-gas has grown in capacity to 1 million bbls. This involves 67 sites of which 55 are leached-out salt caverns, 6 are mined from rock and 6 are water-bearing or old oil or gas fields. Completion of projects now under way will bring capacity to nearly 4 million bbls. Cost is $1 to $2 per bbl. of capacity. J. D. Parent

Odorization

Deininger, N. and McKinley, R. W. INVESTIGATION OF NEW ODORANTS FOR NATURAL GAS. INTERIM REPORT NO. I. AGA Proj. PF-7 (1952) May.

This report for the period September 1950 to December 1951 indicates the techniques involved in the development of laboratory-type odorants and the Odor Profiles (A.D. Little, Inc.) of selected manufactured and natural gases.

Authors' Abstract

Fitzgerald, W. J. GAS ODORIZATION IN DISTRIBUTION SYSTEMS. *Am. Gas J.*, **176**, 25-28 (1952) June.

This article gives a review of current odorization practice. Various types of commercial odorants, odorizers, and odorizer buildings are discussed. Several methods of measuring odor intensity are described. C. E. Hummel

Moran, T. C. EXPERIENCE AND PRACTICES IN GAS ODORIZING IN THE NIAGARA MOHAWK SYSTEM. *Am. Gas J.*, **177**, 16-17, (1952) July.

A 50-50 mixture of concentrated cyclic sulfide and dilute sulfide odorants is being added at a rate of 1.15 pounds per MMCF to one division of this system with satisfactory results. Other divisions are using a concentrated mercaptan odorant at 0.78 lbs. per MMCF with comparable results. Daily checks are made on the rate of odorant addition, and this rate is adjusted to give a satisfactory odor level to the gas as determined by smell tests at remote points of utilization. Various odorization problems are discussed, and plant and operating costs are included. C. E. Hummel

Oil Fogging

Lusby, O. W. DESIGN AND OPERATION OF OIL FOGGERS AT BALTIMORE. Paper PC-52-3, Am. Gas Assoc., Operating Section, New York, May, 1952: Am. Gas J. **177**, 18-19 (1952) August.

The new type of hot-oil fogger developed for operations at Baltimore embodies the principles of heating the sweep-gas rather than supplying direct heat to the oil; continuously contacting the hot gas with fresh oil, and continuously removing the residue of unvaporized oil from contact with the gas stream. The fogging rate is positively controlled through the rate at which oil is added to the gas by a controlled-volume pump. Two years of trouble-free operation have demonstrated the advantages of this type of fogging equipment. The fog produced has excellent stability, and has been found widely distributed throughout the system. A means of clearly establishing the presence of oil fog in the gas has been developed.

Author's Abstract

Pipe Line Deposits

Bissey, L. T. ORIGINS AND CHARACTER OF DEPOSITS IN NATURAL GAS PIPELINES. *Am. Gas. J.*, **177**, 16-17, 48 (1952) August: Paper PC-52-1, AGA (1952) May.

Studies conducted by the Pennsylvania Natural Gas Men's Association are reported. Construction dirt, mill scale and internal corrosion of the pipeline system form the sources for pipeline deposits. These deposits consist chiefly of fine powdery forms of iron oxide, and a small amount of silicon dioxide, sodium chloride and salts of calcium and magnesium. D. C. Gami

Best, P. F. EVALUATION OF GAS SCRUBBERS. *Petroleum Eng. (Reference Annual)*, **24**, D57-59 (1952) July 15.

Some operational characteristics of the dry (vortex) type of dust eliminator are presented.

J. D. Parent

River Crossing Design

Odom, L. M. and Higgs, J. W., Jr. EFFECT OF HYDRODYNAMIC FORCES ON PIPELINE CROSSINGS OF RIVERS. *Oil Gas J.*, **51**, 272-286 (1952) July 28.

It is the objective of this paper to make available to those responsible for the design of pipeline crossings the essential features of recent investigations concerning the mechanism of turbulence as they apply to pipe-line crossing designs. The fundamental theory of turbulent flow is discussed and the basic derivations necessary for an understanding of the phenomena are given. The method by which pressure differentials resulting from turbulence may be calculated is illustrated. A brief discussion of the effect of turbulence on submerged pipe lines is included. The characteristics of drag and the resulting loads are also briefly considered. A brief bibliography is given to aid the reader in a more detailed study of turbulent flow. Authors' Abstract

Owens, S. A PIPE GOES TO BROOKLYN. *Petroleum Eng.*, 24, D3-D9 (1952) August.

Transcontinental Gas Pipe Line Corporation have completed the placement of a 26"-diam. natural gas pipe line across the Narrows from Staten Island to Brooklyn, New York. The engineering procedures and avoidance of ship traffic during the operation are described and illustrated. (See also *Gas Abstracts*, 8, 154 (1952) August. D. C. Gami

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Coal Synthetics

SYNTHETICS: STILL HIGH. *Oil Gas J.*, 51, 54 (1952) August 4.

The cost of synthetic gasoline produced in quantities of 285 to 300 million gallons per year by coal hydrogenation was estimated at 25.9 and 46.9 cents/gal. by the U.S. Bureau of Mines and the National Petroleum Council, respectively. The latter figure is believed to be more realistic because large quantities of by-product chemicals produced in the coal hydrogenation process would tend to lower the market price for coal chemicals and thus reduce allowable credits. Additional cost estimates for gasoline from oil shale, modified coal hydrogenation, and Fischer-Tropsch are being prepared by the NPC. C. von Fredersdorff

Sherwood, P. W. PETROCHEMICALS FROM WATER GAS. PART 3.—COAL HYDROGENATION AND GAS SYNTHESIS PRODUCE HYDROCARBONS AND THE OXO PROCESS SYNTHESIZES ALCOHOLS. *Petroleum Eng.*, 24, C13-C18 (1952) July.

A discussion of the various methods (coal hydrogenation, Fischer-Tropsch, and Oxo process) of producing non-gaseous hydrocarbons from water gas is presented. H. A. Dirksen

Desulfurization

Adey, S. W. and Porter, F. W. (assigned to Anglo-Iranian Oil Co., Ltd.) CATALYTIC DESULFURIZATION OF PETROLEUM HYDROCARBONS. U.S. 2,604,436 (1952) July 22.

In the autofining process organic sulfur in petroleum hydrocarbons is converted to hydrogen sulfide by passage over a cobalt molybdate catalyst. Hydrogen for the process is simultaneously produced by dehydrogenation of naphthenes. Improvement of this process by using a moving bed of granular catalyst is claimed. D. M. Mason

Cash, W. E. BRITAIN'S FIRST SULPHUR-FROM-PETROLEUM PLANT. *Chem. Process Eng.* (British), 33, 365-366 (1952) July.

This article discusses, briefly, the operation of a new sulfur recovery plant at Stanlow, England, operated in conjunction with an oil refinery. The refinery provides a feed stock of hydrogen sulfide which is purified by absorption in diethanolamine. The purified hydrogen sulfide is passed into a Claus kiln together with air and a redox reaction takes place, elemental sulfur of 99.9% purity being the product. No technical data is presented. J. Wrozina

Connor, J. E. and Gustafson, C. E. (assigned to Standard Oil Development Co.) REMOVAL OF SULFUR COMPOUNDS FROM HYDROCARBON FRACTIONS. U.S. 2,604,437 (1952) July 22.

Addition of sulfur to a caustic solution increases the effectiveness of such solutions for the removal of mercaptans from gasoline blending stocks. D. M. Mason

Drilling Fluids

Fischer, P. W. (assigned to Union Oil Co.) OIL-BASE DRILLING FLUIDS. U.S. 2,607-731 (1952) August 19.

It is claimed that drilling fluid containing mixtures of partially saponified decarboxylated rosin and partially saponified disproportionated rosin impart good gel strength and improved fluid-loss property. D. C. Gami

Shale Oil Refining

Pelipetz, M. G., Wolfson, M. L., Ginsberg, H. and Clark, E. L. HIGH-PRESSURE HYDROGENATION OF CRUDE SHALE OIL. *Chem. Eng. Progress*, 48, 353-356 (1952) July.

Crude shale oil, obtained by the retorting of Colorado oil shale in a gas-flow retort, was hydrogenated over several solid catalysts in

a continuous high-pressure unit on a once-through basis. At 9000 psig hydrogen pressure and at temperatures of 800° to 900° F., a product oil essentially free of sulfur and nitrogen and suitable for further processing by standard petroleum methods can be produced. Using tungsten or cobalt molybdate catalysts, 40 to 50 vol. % of the product oil obtained by hydrogenation can be utilized as high-quality diesel fuel (cetane ratings of 50 to 60). Depending on the type of catalyst used and the temperature of operation, hydrogen consumption varied from 2000 to 2800 cu.ft./bbl. of shale-oil feed.

Authors' Abstract

Synthesis Catalyst

Friedman, A. H. (assigned to Phillips Petroleum Co.) REGENERATION OF A CARBONIZED FISCHER-TROPSCH CATALYST. U.S. 2,605,234 (1952) July 29.

A process is claimed by which a metallic catalyst is freed of carbon by self-abrading in an inert atmosphere, or an atmosphere of hydrogen and carbon monoxide at a temperature which the gas is inert to the material.

W. J. Pleticka

Kearby, K. K. and Black, J. F. (assigned to Standard Oil Development Co.) CATALYTIC CONVERSION. U.S. 2,605,275 (1952) July 29.

An improved process is claimed for producing liquid hydrocarbons from H_2 and CO using a bivalent iron component and magnesium oxide or zinc oxide so as to have a mixture capable of forming a spinel-type compound, the particles of which are utilized in a fluidized mass.

W. J. Pleticka

Montgomery, C. W. and Horne, W. A. (assigned to Gulf Research and Development Co.) PROCESS OF SYNTHESIZING HYDROCARBONS. U. S. 2,602,810 (1952) July 8.

A procedure for obtaining hydrocarbons from synthesis gas using an iron oxide catalyst under superatmospheric pressure is described. The maximum reactor temperature is kept within 100 to 200° F. of the inlet gas temperature by using large excess of hydrogen over carbon monoxide, and by recycling the product gas that is 8 to 15 times the volume of the feed gas, so that the inlet hydrogen to carbon monoxide ratio varies from 15:1 to 30:1. S. Mori

7. ANALYTICAL METHODS AND TESTS

Aromatics Determination

Mills, I. W. DETERMINATION OF AROMATICS. *Petroleum Eng. (Reference Annual)*, 24, C51-C52 (1952) July 15.

This article discusses the determination of aromatics, using an absorption column containing silica gel and clay. The oil sample is washed with n-pentane until the washings are oil-free; this is checked by a refractometer. All the products from the column, oil and washings, are collected and thoroughly mixed. An aliquot is taken and the n-pentane is evaporated. The loss in weight of the sample is a measure of the weight of aromatics absorbed by the column. The author cautions against using this method on oils whose initial boiling point is lower than 550° F. J. Wrozina

Catalyst Structure

Roof, R. B., Jr. THE CRYSTALLOGRAPHY OF NICKEL KIESELGUHR. *J. Chem. Physics*, 20, 1181-1184 (1952) July.

The X-ray analysis of a nickel kieselguhr, herewith reported, claims that the lines, too often attributed to a form of hexagonal close-packed nickel, actually belong to Ni and NiO. This interpretation is due to the fact that those lines, although of different structure, come to a very close approximation to hexagonal because of crowding. S. Sensi

Coal Volatile Matter

Padovani, C., Siniramed, C., and Strambi, E. CONTRIBUTO ALLO STUDIO DI UN METODO NORMALIZZATO PER LA DETERMINAZIONE DELLE SOSTANZE VOLATILI. (CONTRIBUTION TO THE STUDY OF A STANDARD METHOD FOR THE DETERMINATION OF VOLATILE MATTER). *Rivista dei Combustibili*, 6, 301-315 (1952) May.

This is a study made by several European countries on the same series of samples to establish a standard method for the determination of volatile matter in coals. Belgian, French, English and Italian methods are compared and discussed. These match quite closely in procedure and results. The authors claim accuracy and reproducible constancy for their method, which, altho

giving slightly higher results, presents differences of the order of those reported between the rest of the methods. S. Sensi

Fractionation Analysis

Podbielniak, W. J. (assigned to W. G. Podbielniak) MULTIPLE THERMOCOUPLE FRACTIONATING COLUMN. U.S. 2,602,046 (1952) July 1.

Six thermocouples have been spaced at intervals of $\frac{3}{8}$-in. in the condensing section of an analytical low temperature fractional distillation column, in order to record more positively the boiling point of the topmost reflux and vapor distillate leaving the column. A reading from each thermocouple in turn is recorded on a strip chart at frequent intervals by means of a switching device and electronic potentiometer. The envelope of the curve so obtained represents the lowest temperature of the six and hence the desired boiling point.

D. M. Mason

Sulfur in Oil Shale

Mapstone, G. E. abd Nartsissov, B. SULPHUR IN OIL SHALE OR TORBANITE. *J. Appl. Chem.* (British), 2, 405-407 (1952) July.

Mott's rapid method for the determination of sulphate and pyritic sulphur in coal can be applied to oil shale or torbanite, the pyrites content being calculated from the iron extracted. The organic sulphur is best calculated by subtracting the pyritic sulphur from the total sulphur content of the hydrochloric acid-extracted material as determined by the quartz-tube method. On the pyrolysis of the torbanite approximately only 1% of added pyritic sulphur appears as organic sulphur in the oil. Similarly the addition of calcium carbonate had no effect and calcium hydroxide had only a slight effect on the organic sulphur content of the oil. None of these materials affected the oil yield significantly. Authors' Abstract

Tar Composition

Forsdike, R. THE COMPOSITION OF TARS OF VARIOUS ORIGINS. *Gas World* (British), 136, 350 (1952) August 9.

The three main influencing factors in the quality of tars are: (a) temperature of carbonization, (b) time of carbonization, and (c) free space above the charge. These factors are discussed in relation to the amounts of benzol, naphthas, tar acids, naphthalene oils, creosote, and pitch produced. R. Parker

McNeil, D. SOME NOTES ON THE CHEMICAL COMPOSITION OF COAL TAR CREOSOTE. *Gas World* (British), 136, 105-108, 117 (1952) July 12.

This article discusses the composition of coal tar creosote, with particular attention to the different classes of chemical compounds which are found in this substance. Probable mechanisms for the formation of the various structures are discussed, with a brief summary of the effect of carbonization conditions on the tar and creosote composition. J. I. Wrozina

Viscometry

Higginbotham, R. S. and Benbow, J. J. TWO VISCOMETERS FOR RAPID MEASUREMENTS AT DEFINITE SHEARING STRESSES. *J. Sci. Instruments* (British), 29, 221-224 (1925) July.

Two modifications of the cone and plate viscometer are described. The first, for measurements at low shearing stresses (10 to 100 dyn/cm^2), employs a phosphor-bronze strip to apply torque to the cone. The second, a direct reading instrument for measurements at a relatively high stress (4500 dyn/cm^2), uses a small d.c. motor running at constant torque to drive the cone. The range of the first instrument is 1 to 100 poises at 10 dyn/cm^2, and 10 to 1000 poises at 100 dyn/cm^2; that of the second is 0.5 to 30 poises. Their accuracy varies according to the viscosity and anomaly of the fluid under examination, but the average is about $\pm 5\%$, which is quite adequate for many purposes. The examination of a sample with either instrument, including filling and cleaning, can be completed within two minutes. Authors' Abstract

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Dyne, P. J. OBSERVATIONS ON THE "CS" RADICAL. p. 199

Martin, A. E. IDENTIFICATION OF ORGANIC COMPOUNDS. p. 201

Spengler, G. SELECTIVE ADSORPTION OF HYDROCARBONS. p. 200

8. GENERAL AND PHYSICAL CHEMISTRY

Ammonia Synthesis

Resen, F. L. PHILLIPS CHEMICAL CO., HOUSTON PLANT ENGAGED IN EXPANSION WHICH WILL GREATLY INCREASE NUMBER OF PRODUCTS MANUFACTURED. *Oil Gas J.*, **51**, 58-59 (1952) July 7.

The article reports that the facilities of Phillips' Houston plant are expanding to include the production of synthetic pyridines and ammonia from natural gas, besides the production of ammonium sulfate. W. J. Pleticka

Carbon Oxidation

Patai, S., Hoffmann, E. and Rajbenbach, L. THE OXIDATION OF CARBON BY AIR. I. CATALYSIS IN THE OXIDATION OF CARBON BLACK BY AIR. 306-310; II. CATALYTIC EFFECTS IN THE OXIDATION OF GRAPHITE, NUCHAR AND SUGAR CHARCOAL BY AIR. 311-314; *J. Applied Chem.* (British) **2** (1952) June.

The reaction rate of carbon black with oxygen is a function of temperature, the number of unoccupied active centers on the carbon surface and the type of impurities present. A second order reaction appears to control. The presence of suitable catalysts may increase the reaction rates 20 times or more. Two mechanisms to explain the inconsistencies of the catalytic effect of these impurities upon various types of carbon sources are presented in part II.

S. Mori

Chemisorbed CO

Eischens, R. P. and Webb, A. N. CARBON-OXYGEN EXCHANGE IN CHEMISORBED CARBON MONOXIDE. *J. Chem. Physics*, **20**, 1048-1049 (1952) June.

The mechanism of the chemisorption of carbon monoxide on an iron oxide surface has been studied using known quantities of isotopic $C^{12}O$ and CO^{18} to see whether any carbon-oxygen exchange is involved. Results show that between 120-160° C. the equilibrium concentration for C^{13} O^{18} wos obtained indicating that exchange of the adsorbed oxygen does take place in the process of desorption. The exchange could be explained by either the carbon being attached to two oxygen molecules and desorbed with either one, or else both the carbon and the oxygen exist as atomic species on the iron oxide surface. S. Mori

CS Radical

Dyne, P. J. and Ramsay, D. A. SOME OBSERVATIONS ON THE CS "RADICAL". *J. Chem. Physics*, **20**, 1055-1056 (1952) June.

Analysis of its spectrum has indicated that the CS radical is better described as a molecule and that it should be stable in the gas phase. In experiments in which CS was produced both by high frequency discharge and by ultraviolet radiation, life times of CS as long as 30 minutes were obtained. It was concluded that CS is stable in the gas phase but polymerizes on surfaces. D. M. Mason

Energy of Formation

Krevelen, D. W. and Chermin, H. A. ESTIMATION OF THE FREE ENERGY (GIBBS FREE ENERGY OF FORMATION OF ORGANIC COMPOUNDS FROM GROUP CONTRIBUTIONS. *Chem. Eng. Science* (British), **1**, 66-80 (1951) December.

A method is proposed whereby the free energy of formation of organic compounds in the ideal gaseous state is resolved into contributions attributable to atomic groups. Free energy of formation of complex molecules are readily estimated by summation of the contributions of their component groups. The average deviation of the free energy of formation of organic compounds calculated by this method is ± 0.6 kcal/mol. Authors' Abstract

Flame Speed

Lichty, L. C. EVALUATION OF FLAME SPEED AT BURNER FLAME TIP. *Ind. Eng. Chem.*, **44**, 1395-1398 (1952) June.

This article suggests a ram effect of the central lamina of a bunsen flame as an explanation of the high flame speed found at the flame tip.

E. F. Searight

Flame Stability

Grumer, J. and Harris, M. E. FLAME-STABILITY LIMITS OF METHANE, HYDRO-

GEN, AND CARBON MONOXIDE MIXTURES. *Ind. Eng. Chem.*, 44, 1547-1553 (1952) July.

A method is suggested for determining flame stability diagrams of multicomponent systems from a consideration of the diagrams for binary systems of the various components.

E. F. Searight

Graphite Diffraction

Bacon, G. E. THE POWDER DIFFRACTION INTENSITIES OF GRAPHITE FOR X-RAYS AND NEUTRONS. *Acta Crystallographica*, 5, 492-499 (1952) July.

Measurements are reported of the powder diffraction intensities of graphite for both X-rays and neutrons, with due allowance for crystallite orientation, thermal vibrations and the rhombohedral modification. The neutron intensities agree with those calculated from the Bernal structure to within 5%, thus showing that discrepancies in X-ray intensities must be mainly due to the inadequacy of the James & Bradley *f* curve. Comparison with the curve given by McWeeny suggests a certain, but only small, asymmetry of electron distribution. The neutron intensities, although confirming the Bernal method of layer stacking, cannot decide for or against Lukesh's proposed slight distortion of the carbon hexagons. Author's Abstract

Paraffin Equilibria

Reamer, H. H., Sage, B. H., and Lacey, W. N. PHASE EQUILIBRIA IN HYDROCARBON SYSTEMS. METHANE-n-BUTANE-DECANE SYSTEM AT 40° F. *Ind. Eng. Chem.* 44, 1671-1675 (1952) July.

The results of a study of the phase behavior of the methane-*n*-butane-decane system at 40° F. and pressures of 1000, 2000, 3000, and 4000 psia are presented in graphical and tabular form. A correlation of the critical pressure and temperature of this system as a function of composition is presented. O. T. Bloomer

Selective Adsorption

Spengler, G. and Krenkler, K. SELECTIVE ADSORPTION OF HYDROCARBONS. *Petroleum Refiner*, 31, 111-114 (1952) July.

Results of experiments on the selective adsorption of various paraffinic, olefinic, naphthenic and aromatic hydrocarbons on activated carbon and silica gel are reported. Each of the hydrocarbons were dissolved in a light naphtha fraction and the adsorption was determined. The results obtained indicated that silica gel would be specific in separating saturated from unsaturated hydrocarbons, while activated carbon would be specific in separating hydrocarbons with different lengths of side chains or different molecular weights. O. T. Bloomer

Vapor Pressures

Perry, R. E. and Thodos, G. VAPOR PRESSURES OF THE LIGHT NORMAL SATURATED HYDROCARBONS. *Ind. Eng. Chem.*, 44, 1649-1653 (1952) July.

An equation to calculate vapor pressures of a normal paraffinic hydrocarbon over its active range from triple-point to critical point has been presented. All the four constants of the equation for all the selected hydrocarbons from methane to n-dodecane are given in tabular form. The average overall deviation between the experimental and calculated value of vapor pressure for methane through n-dodecane was found to be 0.27% (27 references).

D. C. Gami

X-Ray Diffraction

Beevers, C. A. A WEISSENBERG X-RAY DIFFRACTION CAMERA. *J. Sci. Instruments* (British) 29, 230-232 (1952) July.

A camera suitable for Weissenberg and other types of X-ray diffraction photographs is described. The special features are its simple and substantial construction, and the large diameter of filmholder and consequent large size of the photograph. The distance from focal spot to crystal is 100 mm and thus exposure times are particularly short. These advantages are gained by the sacrifice of the equi-inclination feature provided in the majority of Weissenberg cameras. Author's Abstract

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Reamer, H. H. PROPERTIES OF MIXED PARAFFINIC AND OLEFINIC HYDRATES. p. 194

Zimmerman, R. H. SUPERCOMPRESSIBILITY FACTORS FOR NATURAL GASES. p. 193

9. ORGANIC CHEMISTRY

Aldehyde Synthesis

Hale, C. H. (assigned to Standard Oil Development Co.) IRON REMOVAL FROM ALDEHYDE SYNTHESIS PROCESS. U.S. 2,604,491 (1952) July 22.

This patent pertains to the recovery of cobalt and iron dissolved in synthetic aldehyde products, by decomposing under pressure in hydrogen at 400° F., then agitating the effluent products with ionized alkaline solution at 50 to 300° F. to precipitate the remaining iron, settling and decanting. O. P. Brysch

Ethylene Hydrogenation

McCabe, C. L. and Halsey, G. D., Jr. THE HYDROGENATION OF ETHYLENE OVER COPPER. I. REPRODUCING THE ACTIVITY OF THE CATALYST. *J. Am. Chem. Soc.*, 74, (1952) June 5.

One of the factors which determines the activity of a reduced copper catalyst toward the hydrogenation of ethylene is the amount of chemisorbed hydrogen on the catalyst surface. The kinetic experiments show that this hydrogen does not serve as a reactant. It thus can be considered to function as part of the catalyst. Three distinct methods of getting varying amounts of chemisorbed hydrogen off the surface are employed and the activity of the catalyst as a function of the parameter governing the amount of chemisorbed hydrogen on the surface is reported. Control of this coverage of chemisorbed hydrogen allows the activity to be reproduced to within 5% over a series of 50 runs. Authors' Abstract

Extractive Crystallization

Kobe, K. A. and Domask, W. G. EXTRACTIVE CRYSTALLIZATION—A NEW SEPARATION PROCESS. PART III. PRACTICAL APPLICATIONS. *Petroleum Refiner*, 31, 125-130 (1952) July.

Suggested practical applications of the ability of urea to form crystalline complexes with straight-chain organic compounds are discussed. These include upgrading of gasoline and lubricating oil stocks, decolorizing medicinal and specialty feed stocks, separation of fatty and drying oils. Analytical applications and some details of operating factors are also discussed. D. M. Mason

Mercaptan Pyrolysis

Thompson, C. J., Meyer, R. A. and Ball, J. S. THERMAL DECOMPOSITION OF SULFUR COMPOUNDS. II. 1-PENTANETHIOL. *J. Am. Chem. Soc.*, 74, 3287-3289 (1952) July 5.

1-Pentanethiol was thermally decomposed in a quartz tube at 350° to 500° C. Decompositions from 0.2 to 87% were achieved with residence times of 10 to 120 seconds. Hydrogen sulfide was the predominant sulfur compound formed. A mechanism for the decomposition is proposed. C. E. Hummel

Organic Spectra

Martin, A. E. IDENTIFICATION OF ORGANIC COMPOUNDS FROM INFRA-RED SPECTRA. *Nature* (British), 170, 20-22 (1952) July 5.

At present the spectra of about 3,000 organic compounds have been cataloged. In order to have a fairly complete record of spectra data, approximately 70,000 of the more common compounds should be investigated. A method is presented in which this data can be obtained and filed, at the rate of about 20,000 spectra per year. R. Parker

Phenol Synthesis

Chitwood, H. C., Fitzpatrick, J. T., Fowler, G. W. and Freure, B. T. PHENOLS BY DEHYDROGENATION. *Ind. Eng. Chem.*, 44, 1696-1711 (1952) July.

A study of phenol manufacture by catalytic dehydrogenation of cyclohexanol and cyclohexanone using a nickel, copper, chromium and platinum catalyst is presented. W. J. Pleticka

Synthetic Chemicals

Brarston-Cook, H. E. PETROLEUM PLAYS A GROWING ROLE IN MANUFACTURE OF AROMATICS. *Petroleum Processing*, 7, 1145 (1952) August.

The various processes for the production of aromatics are discussed along with some uses for the aromatics. W. J. Pleticka

10. CHEMICAL ENGINEERING

Air-Water Transfer

Hensel, S. L., Jr. and Treybal, R. E. AIR-WATER CONTACT. ADIABATIC HUMIDIFICATION OF AIR WITH WATER IN A PACKED TOWER. *Chem. Eng. Progress*, **48**, 362-371 (1952) July.

The individual heat and mass transfer coefficients for the gas film for the system air-water are given. The ranges of variables covered are: 120 to 6800 lb./(hr.) (sq. ft.) of liquid flow; 100 to 1900 lb./(hr.) (sq. ft.) of gas flow; the inlet air temperature 100° to 260° F.; and packing heights of 3⅛, 6-5/16 and 13⅛ inches of 1½ in. Berl saddles. The water temperature was maintained constant throughout the towers. Observed heat and mass transfer coefficients are considered accurate to within ± 5% and ± 10% respectively. It is concluded that the apparent psychrometric ratio for a packed tower is neither constant nor equal to the humid heat of the main air stream, but varies from 0.23 to 0.58. D. C. Gami

Contacting Column

Cannon, M. R. DISTILLATION, ABSORPTION, AND EXTRACTION COLUMN. *Oil Gas J.*, **51**, 268-271 (1952) July 28.

Utilizing the principles of fluid dynamics, the author has designed a jet contactor to provide more intimate mixing of liquid and vapor on trays in columns used for separation processes. Liquid and vapor are mixed in a high-velocity tube to give a high degree of turbulence. This mixing causes an increase in the rate of mass transfer and destruction of any areas of localized turbulence. Author's Abstract

Dust Separators

Israel, J. J. CYCLONE SEPARATOR. U.S. 2,604,956 (1952) July 29.

This patent describes a two-stage cyclone separator wherein the secondary collector is concentrically positioned within the primary collector. E. J. Pyrcioch

Kane, J. M. OPERATION, APPLICATION AND EFFECTIVENESS OF DUST COLLECTION EQUIPMENT. *Heating and Ventilating*, **4T**, 87-98 (1952) August.

The types, effectiveness and selection of dust collection equipment is discussed. Factors to be considered in the selection of the equipment include concentration and particle size of contaminant, the degree of collection required, and the characteristics of the gas stream and contaminant. Based on efficiency and costs, most dust collectors can be classified into one of three lasses: (1) electrostatic and sonic precipitation having high efficiency and high cost; (2) high efficiency, moderate cost collectors including fabric collectors, packed towers and wet centrifugals; (3) low pressure-drop cyclones and collectors which fall into the low efficiency, low cost class. No one design is suited for all applications. In addition to the type of equipment consideration should be given to provision for dust disposal, location, servicing and maintenance of the equipment and the recirculation of cleaned air from the dust collectors. A chart giving collector performance as a function of particle size and concentration for representative types of equipment is included along with a table comparing important dust collector characteristics. E. J. Pyrcioch

Mercier, E. and Ehlinger, M. (assigned to Moore, Inc.) APPARATUS FOR REMOVING DUST FROM GASES. U.S. 2,603,309 (1952) July 15.

An apparatus for removing solid particles from gases is described. Particle removal is accomplished by subjecting the flowing dust-laden gas to an abrupt change of direction of 180°, the radius of curvature being small, of the order of 1 cm. This action forces the particles to the outside of the bend where they are separated from the gas. E. J. Pyrcioch

Fluidized Heat Transfer

Heerden, C., Nobel, P. and Krevelen, D. W. STUDIES ON FLUIDIZATION. II.—HEAT TRANSFER. *Chemical Eng. Science* (British), **1**, 51-66 (1951) December.

The heat transfer coefficient from a cylindrical wall to a fluidized bed of solids was measured

under a variety of conditions in laboratory scale equipment. A correlation is proposed.

J. D. Parent

Heat Transfer

Lohrisch, F. W. HEAT-TRANSFER COEFFICIENTS FOR INDUSTRIAL GASES. *J. Applied Chem.* (British), **2**, 464-469 (1952) August.

In order to find out the correct size required for heat exchangers, waste-heat boilers, gas coolers, etc., heat-transfer coefficients are needed. Although the available literature provides us with the most recent formulae for these coefficients it is nevertheless difficult to assemble all the technical data of the required dimensions. This is especially tedious for those who deal only occasionally with the subject. The physical and chemical properties of the gases are given partly in British and partly in metric units. Thus the inevitable conversion needed to reduce all the figures to the one system of measurement requires much time and study if mistakes are to be avoided. Furthermore, the values given for the thermal conductivity of gases differ in a remarkable degree in the various available lists which, also, ignore many of the more recent valuable experimental figures. The writer has therefore prepared charts for the rapid determination of heat-transfer coefficients and the presentation of new data based on recent experimental figures for the thermal conductivity of single gases and of gaseous mixtures. These charts are applicable to the gases commonly used in industry. Author's Abstract

Suspension Densities

Jottrand, R. APPLICATION OF THE MEASUREMENT OF THE DIELECTRIC CONSTANT IN A STUDY OF DECANTATION. *Chem. Eng. Science* (British), **1**, 81-85 (1951) December.

The concentration of a suspension at any point is determined by measuring the capacity of a condenser which is designed not to interfere with the effect being studied. Experiments with silica powder of 56 microns diameter in a mixture of benzene and nitrobenzene indicate that the degree of packing of the sediment is a function of its height and not of the time it is left in the settling tank. The method can also be employed for measurements in cyclone separators or in fluidized beds. Author's Abstract

11. PROCESS EQUIPMENT AND INSTRUMENTATION

De-Oxygenation System

Bromley, L. A., Edwards, R. K., and McKisson, R. L. SODIUM PUMP FOR PURIFICATION OF INERT ATMOSPHERES. *Rev. Sci. Instruments*, **23**, 342-344 (1952) July.

A liquid sodium pump and contacting tray are described and recommended for the removal of oxidizing gases from inert atmosphere working chambers. The inert gas is circulated over streams of molten sodium on the contacting tray. With this apparatus it is easy to obtain an atmosphere whose reactivity is less than the best vacuum in which comparable manipulations may be accomplished. Authors' Abstract

Flow Measurement

Baird, R. C. and Bechtold, I. C. DYNAMICS OF PULSATIVE FLOW. *Petroleum Eng.*, **24**, D41-D56 (1952) July.

The problem of pulsative flow in orifice metering are analysed by using electrical, mechanical and acoustical analogies. The authors assume that the fundamental error in the measurement of pressure drop occurs in the differential and not in the inferential measurement. Two theories,—pulse phase shift and inflection theory—are put forward to solve the problem. The inflection theory is substantiated by some experimental evidence. In most cases pulsative-type flow could be eliminated by the use of filter-type pulsation dampeners. D. C. Gami

Gas Cooler

Serduke, J. T. APPARATUS FOR COOLING GASES. U.S. 2,605,619 (1952) August 5.

A gas-cooling apparatus is described comprising a gas turbine wherein the gas is cooled by causing it to flow through a restricted orifice at its critical velocity from a high pressure area to one of lower pressure and to do work on a rotor. E. J. Pyrcioch

Gas Main Plug

Preston, W. E., Cappelen, A. L., and Miller, D. B. (assigned to Mueller Co.) PIPE LINE STOPPER. U.S. Re. 23,526 (1952) July 22.

Stopping flow in a live main not equipped with a valve has sometimes been achieved by freezing water into ice in the desired location. This in-

vention offers a mechanical device for flow stoppage. A nipple is welded on the line, a gate valve attached, the wall is cut and the novel valve means lowered into place. J. D. Parent

Gas Washer

Johnstone, H. F. and Anthony, A. W., Jr. (assigned to Pease, Anthony Equipment Co.) METHOD AND APPARATUS FOR TREATING GASES. U.S. 2,604,185 (1952) July 22.

An apparatus for washing gases is described. The apparatus consists of a venturi throat where the gases are accelerated and a nozzle arrangement adjacent to the throat whereby a washing liquid is distributed throughout the gas stream cross-section. Separation of the mixture of gas and droplets takes place in a liquid sprayed cyclone type separator.

E. J. Pyrcioch

Nitrogen Production

Fugassi, J. P. (assigned to The United States of America, Secretary of the Navy) NITROGEN PRODUCTION. U.S. 2,605,170 (1952) July 29.

This invention relates to an apparatus for producing nitrogen from air by reaction of the oxygen in air with heated copper gauze to form copper oxide. The copper is regenerated by passing hydrocarbon vapor over the oxide. In this invention continuous operation is provided by having two units, one on stream, the second being regenerated. O. T. Bloomer

Tank Costs

Plummer, F. L. NEW COST DATA ON FIELD ERECTED STORAGE TANKS. *Chem. Eng. Costs Quarterly*, **2**, 53-75 (1952) July.

A general discussion of all types of field storage tanks with graphs showing the cost plotted against capacity is given. Cost analysis does not include foundations, painting, or auxiliary equipment. W. G. Bair

The following article, the abstract for which appears on the page indicated, is also called to your attention.

Podbielniak, W. J. MULTIPLE THERMOCOUPLE FRACTIONATING COLUMN. p. 198

12. MATERIALS OF CONSTRUCTION

Metal Properties

Ziegler, W. T. PROPERTIES OF METALS BELOW -300° F. *Refrigerating Eng.*, **60**, 843-852 (1952) August.

Mechanical properties, specific heat, thermal expansion and electrical and thermal conductivities of metals below -300° F. are discussed. 25 references are included. D. C. Gami

Pipe Line Welding

Fetters, K. L. LINE PIPE. *Petroleum Eng. (Reference Annual)*, **24**, D29-D33 (1952) July 15.

A short discussion of the manufacture and specifications for large-diameter line pipe is presented. Stress is placed on field welding methods; also a guide to trouble shooting of welding troubles is given. W. G. Bair

Plastic Pipe

Miller, G. PLASTIC PIPE TESTS IN CORROSIVE AREA. *World Oil*, **135**, 258-259 (1952) August.

A test section of 4" plastic pipe has been laid near Magnolia, Ark., to handle the corrosive crudes of that district. The plastic pipe weighs 1 lb/ft and is easily handled and joined. The higher cost (1.5 times equivalent steel pipe) is offset somewhat by lower laying costs and ease of handling. The line is rated at 100 psi maximum service pressure. W. G. Bair

Rice, I. M. NEW PLASTIC TUBING TRIED IN OIL-FIELD SERVICE. *Oil Gas J.*, **51**, 106-107 (1952) August 11.

A glass-fiber-reinforced plastic tubing has been used in a salt-water disposal well. Its application is limited by physical properties but it is corrosion resistant to common well fluids.

O. T. Bloomer

Well Corrosion

Zajac, T. S. GAS-CONDENSATE WELL CORROSION: WHAT IT COSTS AND HOW TO COMBAT IT. *Oil Gas J.*, **51**, 108-112 (1952) August 11.

The author summarises the total cost due to corrosion in gas-condensate wells. Costs for controlling corrosion are also given. D. C. Gami

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